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ABSTRACT

This paper discusses findings and data analysis issues that resulted from a case usability test. The case usability test was conducted as part of a redesign project that aimed to update the existing home page of Indiana University Bloomington. The home page contained links to the Web sites that various institutions in the university had already created, and therefore, it functioned as a portal to various Web sites and employed hierarchical menu structure. The findings relate to the generation of design ideas. Through the usability test, it was founding that users have a somewhat unified viewpoint regarding the menus on the side areas of a Web page. They tend to view them as a "quick" way to access "specific" and "frequently searched" information. The analysis issues are concerned with analyzing task completion rate, time taken, and path taken to finish the tasks. When analyzing these measures, the researcher needs to consider nature of the Web site, portal site in this case usability test, rather than simply looking at whether and how the test participation found the answer. (Author/AEF)

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Web Usability Test Findings and Analysis Issues

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Abstract

In this paper, we discuss findings and data analysis issues that resulted from a case usability test. The findings relate to the generation of design ideas. Through usability test, it was found that users have a somewhat unified viewpoint regarding the menus on the side areas of a web page. They tend to view them as a "quick" way to access "specific" and "frequently searched" information. The analysis issues are concerned with analyzing task completion rate, time taken, and path taken to finish the tasks. When analyzing these measures, the researcher needs to consider nature of the web site, portal site in this case usability test, rather than simply looking at whether and how the test participants found the answer.

Introduction

This paper discusses findings and analysis issues derived from a lab usability test. The procedure of conducting a lab usability test is pretty much standardized and there are standard sets of data typically collected in web site tests such as, task completion rate, time taken, paths taken, and verbal protocol. The analysis of the data, however, varies widely depending on the case. When analyzing usability test data, it is important to consider the nature of the web site. Depending on the nature of the site, the same data can be analyzed differently resulting in different usability indices. In addition, it is well-known in the usability literature that deriving design ideas from usability test data is a difficult task. Generating design ideas is closely related to how the researcher analyzes test data. This paper describes and discusses how a web design team considered the nature of the portal site in data analysis and derived design ideas by distilling data into a finding and the finding into design ideas.

Redesign of a University Web Site

The case usability test this paper derives data from was conducted as a part of redesign project that aimed to update the existing home page of Indiana University Bloomington (IUB) [2]. The home page contained links to the web sites that various institutions in the university had already created. Therefore, it functioned as a portal to various web sites and employed hierarchical menu structure.

It was acknowledged that the site had a high degree of usability because a group of graduate students in the university conducted a user-centered design research and applied the research results when designing the site in 1995 [1]. Although usable, there occurred several reasons to redesign the site. First of all, it was reported that prospective students look at universities' home pages a lot when they consider applying for schools. Keeping the site up-to-date was important in the view of the university's marketing strategy. In addition, information organization of the site was getting messy as the site was accommodating publication requests from various institutions in the university over the years. For example, some pages had too many links and some links were not placed in the page where users would expect to see them. Finally, there has been a consistent request that the site should enhance its visual aspects. With these reasons, IUB Web team began a redesign project in January, 2000 with an emphasis on user-centered design principle.

As the first step of the redesign effort, the design team created a preliminary prototype outlining link categorization only and tested usability of the link categorization. Then, the team produced second prototype where they incorporated results of the usability test and included visual elements. Although the link categorization was assumed to be usable, the team conducted another bigger scale usability evaluation on the second prototype to ensure usability of the overall prototype. Usability evaluation on the second prototype had various goals. In addition to collecting general usability measures such as task completion rate, time taken to complete the tasks, and the links chosen to complete the tasks, the evaluation aimed to measure effectiveness of new navigation features and hear users' opinion about the site in general and visual design in specific. It also targeted to assess accessibility and speed of the site. To achieve such various goals, it was necessary to use various test methods such as a lab usability test, heuristics evaluations, a web-based survey, foreign font display check, and page loading speed check.

Lab Usability Test

The findings and analysis issues discussed in this paper resulted mainly from the lab usability test. The lab test employed typical usability test methodology. Participants were selected through purposeful sampling. Nine users of the current IUB home page were recruited as test participants considering their occupation, web use, gender, and nationality. In the test, the participants were asked to perform eleven tasks using either the new prototype or the existing web site. Through random assignment, participants 1, 3, 4, 5, and 9 were asked to use the new prototype, whereas 2, 6, 7, and 8, the existing site. Through the eleven tasks, participants were asked to search for typically and frequently searched information in IUB site. The tasks also required the

participants to use new navigational features and menu structures. Throughout the test, participants were asked to think out loud. The test administrator observed the test session collecting performance measures such as task completion, time taken, and paths taken as well as the participants' comments and emotional expressions. She sometimes prompted and probed think-aloud, and responded to the user's task-related questions. The whole test sessions were videotaped for later review. After the usability test, a debriefing interview was conducted. The test administrator solicited further comments about the events during the test that she did not understand. In addition, she asked for comments about the web site in general and any suggestions for improvement.

Data Analysis Considering Nature of the Portal Site

Task completion rate, time taken, and paths chosen to complete the tasks are three classical usability measures. Typically, successful completion is considered to be the point when the participant finds the answer. The time taken and the links chosen till the completion point are typically analyzed. Such typical way of analysis, however, didn't seem to work well in the IUB web site test. As the target site of the test was a portal site providing links to various external web sites, it was inevitable for the participants to use sites other than the target site (i.e., external sites) in order to finish the tasks. Indeed, some users spent much time looking at external pages. Some failed to find the answers due to the design problems of the external sites. Simply looking at whether the participant had found the answer or not, and counting total time taken didn't seem to be appropriate measurements. After several rounds of discussion, the team decided to make a distinction between the use of IUB home pages and the use of other sites and collect the three measures during the use of IUB home pages only.

Task Completion

In the case of task completion rate, the team decided to consider that a participant completed a task successfully if she found the link leading to the external site containing the answer (i.e., correct link), regardless she found the answer or not. The fact that the user had found the correct link was assumed to indicate that the link categorization in IUB site was effective enough for the user to get to the right place, which was the main goal of the site. If the user failed to find the answer after getting to the correct page, it was due to the poor design of the external page, which was beyond the goal of the re-design project. Table 2.1 summarizes task completion rate following this analysis decision. If the user found the correct page but failed to find the answer, it was indicated as f/s and counted as a success rather than a fail. Table 2.2 summarizes task completion rate by just considering whether the user found the answer or not. Note the difference in the number of people completed the task successfully between the two tables. T test result on the difference was t = 1.884, df=10, p=.089. Considering small sample size, the difference was almost significant.

<Table 2.1> Task completion rate considering the use of IUB site only

	t1	t2	t3	t4	t5	t6	t7	t8	t9	t10	t11
s1	s	s	s	s	s	s	s	f/s	s	s	s
s3	s	s	s	s	s	s	s	f/s	s	s	s
s4	s	s	f/s	s	f	f/s	s	f	s	s	s
s5	s	s	f/s	s	s	s	s	f	s	s	s
s9	s	s	f/s	s	s	f/s	s	f	s	s	s
No. of people completed the task successfully	5	5	5	5	4	5	5	2	5	5	5

s: success
f: fail
f/s: the user found the correct page but could not find the information due to the poor design of external sites

<Table 2.2> Task completion rate considering the use of not only IUB site but also external site

	t1	t2	t3	t4	t5	t6	t7	t8	t9	t10	t11
s1	s	s	s	s	s	s	s	f	S	s	s
s3	s	s	s	s	s	s	s	f	S	s	s
s4	s	s	f	s	f	f	s	f	S	s	s
s5	s	s	f	s	s	s	s	f	S	s	s
s9	s	s	f	s	s	f	s	f	S	s	s
No. of people completed the task successfully	5	5	2	5	4	3	5	0	5	5	5

Time Taken

In the case of the time taken to finish the tasks, the team decided to count the time spent before the users found the correct external site for the first time. Here, the word "for the first time" is important because several occasions occurred where users found the correct external site initially but could not find the answer in the site. Then, they went back to IUB site, tried other external sites, and went back to the correct site which they looked at previously and found the answer eventually. In this case, the time taken to find the correct external site for the first time seemed to be an accurate measure of the effectiveness of the link categorization. Table 3.1 summarizes time taken to find the correct external page for the first time whereas Table 3.2, total time taken to finish the tasks. The mean time taken is significantly (t= -4.318, df=10, p=.002) different depending on the two different ways of counting time.

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<Table 3.1> Time taken to find the correct external page for the first time (in second)

	t1	t2	t3	t4	t5	t6	t7	t8	t9	t10	t11
s1	105	18	134	13	9	122	26	108	48	29	13
s3	157	35	47	8	16	226	109	157	7	13	36
s4	110	27	54	37	fail	47	103	fail	44	15	40
s5	10	22	36	7	48	26	26	fail	19	41	19
s9	31	135	16	19	33	38	112	fail	3	8	5
Mean time taken	82.60	47.40	57.40	16.80	26.50	91.80	75.20	132.50	24.20	21.20	22.60

<Table 3.2> Total time taken to find the answer (in second)

	t1	t2	t3	t4	t5	t6	t7	t8	t9	t10	t11
s1	135	312	702	45	36	300	242	620	109	35	121
s3	310	253	238	27	34	523	138	332	25	19	102
s4	430	122	420	58	fail	501	243	fail	136	35	311
s5	134	121	331	115	100	40	59	fail	109	44	126
s9	49	428	656	239	201	534	219	fail	10	16	300
Mean time taken	211.60	247.20	469.40	96.80	92.75	379.60	180.20	476.00	77.80	29.80	192.00

Paths

When analyzing the links the participants have chosen till they find the answer (i.e., path taken), it is difficult to derive general currency due to the wide variety of the links people usually choose. It is often possible to analyze how many people followed the ideal thread of links and how many did not, or what links in the ideal thread people did not choose correctly. Such analysis provides the design team with a general evaluation on the effectiveness of the link categorization. However, they do not render much design ideas, other than the requirement to re-place a few links that people did not choose correctly in an ad hoc manner.

The team sought out a more systematic way to utilize the path data and found out that a rich set of design ideas could emerge by summarizing the first link the participants chose to complete each task. Table 1 summarizes the first link participants chose to complete the tasks in the IUB site test. Almost all participants chose the same link to perform tasks 2, 4, 5, and 9. To perform tasks 1, 7, 8, and 10, participants chose more than one link however there was one link that majority of the participants (i.e., three out of five) chose. For example, to perform task 7, three out of five users chose "ss" as the first link whereas two users chose different links. For tasks 3, 6, and 11, people chose three different links and there was no particular link most participants chose.

<Table 1> First link participants chose to complete each task

	t1	t2	t3	t4	t5	t6	t7	t8	t9	t10	t11
s1	pg	aa	vc	vc	ac	cne	cne	ar	aa	lc	ss
s3	pg	aa	ss	vc	ac	cne	adm	ar	aa	lc	ss
s4	aa	aa	ss	cne	cne	pg	ss	ar	aa	lc	lc
s5	gs	aa	adm	vc	ac	ss	ss	ss	aa	pg	lc
s9	pg	ss	vc	vc	ac	pg	ss	ss	hta	ee	ch
Link variability	3	2	3	2	2	3	3	2	2	3	3

Note: Link names are abbreviated. E.g.) "pg" is "people & groups" and "ss" is "student services."

By examining the degree of variability in the choice of the first link, the team could generate design ideas. The data indicated that information related to the tasks 2, 4, 5, and 9 were categorized intuitively enough for most people to select correct entry point. On the contrary, those related to 3, 6, and 11 were not. Therefore, information related to the tasks 3, 6, and 11 needed to be either labeled better or placed in a more appropriate link hierarchy. The data also gave ideas as to where to put certain information. For example, the data clearly indicated that users expected to find information related to the task 8 either in "ar" or "ss" page. Unfortunately, the prototype did not provide that information in either of the pages.

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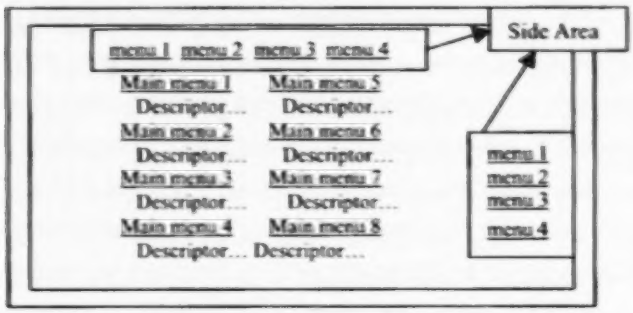
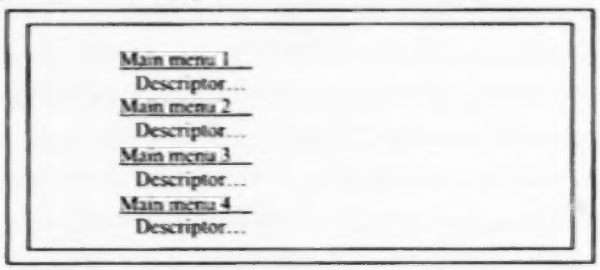
Deriving Design Ideas On Side Menus

The first level page of the IUB site contained ten main menus and each menu had three descriptors underneath. In addition to the main menus, the page included more items on the right-hand side and the upper part of the page, which the design team called "side menus." The existing web site did not have side menus. Figure 1 and 2 depict such difference in the menu structure of the first level page between the new prototype and the existing site.

<Figure 1> First level page's menu structure in the new prototype



<Figure 2> > First level page's menu structure in the existing site



The idea of having side menus in addition to main menus arose from the team's desire to maximize the use of screen space. There have been research articles reporting that some people do not scroll down while they browse menus on the page. In addition, researchers like Jakob Nielsen have been arguing for the breath of menu over the depth.

Initially, the team did not have a clear understanding about the nature of the menus appropriate to each group of the menus. Through usability tests and interviews with test participants, however, it was found out that users had a certain and unified viewpoint on the side menus. They tended to view them as a "quick" way to access "specific" and "frequently searched" information. The specific and frequently searched information are the ones highly identifiable to most users of the site. In the case of a university web site, access points to e-mail system, grading system, or commonly used knowledge base are some examples. This finding derived from the interviews and the observations of the paths test participants took while performing the tasks. Firstly, participants requested that the information presented through the side menus should be replicated somewhere in the main menus. They wanted to be sure that the information was available to them even if they would ignore the side menus entirely. This indicated that the main function of the side menus was a way to access certain information quickly rather than a primary provider of information. Secondly, the prototype subjected to the usability test had a couple of side menus whose nature was somewhat general such as "how to apply" and "computing help." To find admission and computer help information, participants used main menus rather than side menus because, they didn't know what specific information they needed to find out yet and wanted to ensure they were browsing comprehensive list of information available in the site. This indicated that the information presented through the side menus should be specific.

Having identified the nature of information appropriate for the side menus, the design team then discussed kinds of information and a naming strategy appropriate for the side menus. By examining keyword search statistics of the existing IUB site, the team found out that three most specific and frequently searched items were e-mail, INSITE, and Knowledge Base. INSITE was a student service system through which students could view or update their address, class schedules, grades, tuition and fee bills, etc. Knowledge Base was a database of university computing help. As for the menu names, the team adopted the actual names of the systems. The general public might not understand what the names meant however people belonging to the community would understand them. Since the side menus were frequently searched information, targeting people belonging to the community seemed to be appropriate.

Conclusion

Analyzing usability test data to fulfill true purpose of the usability test is not always straightforward. Design teams conduct usability tests usually to measure the degree of usability of their design (i.e., usability indices) and gather ideas for improvement (i.e., design ideas.) This paper described how IUB web team analyzed test data to meet such purposes. In conclusion, it is important to consider nature of the design when analyzing test data. In addition, the process of distilling findings from data and linking the findings to design ideas is an important part of analysis.

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